MIM EXPLORATION PTY LTD
ACN 009 681 118

TECHNICAL REPORT

No. 1977

TITLE

EXPLORATION LICENCE No. 7891 "MULE CREEK"
NORTHERN TERRITORY
FIRST ANNUAL REPORT : YEAR ENDED 15th NOVEMBER 1993

AUTHOR D C KETTLEWELL
DATE November 1993
COPY No. 3

CR94 011
8th December, 1993

The Secretary,
Department of Mines and Energy,
GPO Box 2901
DARWIN NT 0801

Dear Sir,

**RE: EXPLORATION LICENCE NO. 7891**
**FIRST ANNUAL REPORT AND FORWARD PROGRAM**

Please find enclosed our first annual report on EL7891. Also attached is an Expenditure Statement and Geosystem data sheet.

The covenant for the first year has not meet. This was due to the difficulty in acquiring Aerodata as contractor and the delay in modifications to their equipment. This prevented a start to the QUESTEM survey as planned. Please fine enclosed a cheque for $50 for variation of covenant. I apologise for this delay in our exploration program. The survey has been scheduled for April, 1995.

Work in the first year of tenure consisted of an extensive literature review of previous explorers work, remodelling of the NTGS aeromagnetics and finalising the airborne electromagnetic survey (QUESTEM) with Aerodata. The proposed work program for the second year of tenure is as follows:

1. Conduct an airborne electromagnetic survey (QUESTEM) over the licence.
2. Appraise the data so gathered and follow up with ground geophysical techniques if warranted.
3. Diamond drilling any targets generated by the above work, if time allows

The estimated minimum cost of this work is estimated to be $50 000.

Yours faithfully,

[Signature]
Derrick Kettlewell
**Project Geologist - Northern Territory**
<table>
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<tr>
<th>Item</th>
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<td>Drafting Services</td>
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<td><strong>TOTAL DIRECT COST</strong></td>
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<td><strong>TOTAL CURRENT TERM</strong></td>
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<td>PREVIOUSLY REPORTED</td>
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<td><strong>TOTAL PROJECT EXPENDITURE</strong></td>
<td><strong>8,621</strong></td>
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A E COVACICH
MANAGER ACCOUNTING
MIM EXPLORATION PTY LTD

TECHNICAL REPORT

No. 1977

TITLE
EXPLORATION LICENCE 7891 "MULE CREEK"
NORTHERN TERRITORY
FIRST ANNUAL REPORT
YEAR ENDED : 15th NOVEMBER 1993

ISSUING
DEPARTMENT
EXPLORATION

AUTHOR
D C KETTLEWELL

INVESTIGATIONS
CONDUCTED BY
BRISBANE BASED MIM EXPLORATION STAFF

SUBMITTED BY
R D M WILSON

DATE
NOVEMBER 1993

This material contains information of a
classified or confidential nature and
exempt from disclosure under the Freedom of
Information Act 1982 - Queensland is claimed.
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FIG. 1: Location Map

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<table>
<thead>
<tr>
<th>DRAWING NO.</th>
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<td>Aeromagnetic Pseudocolour-intensity Image</td>
<td>1:50 000</td>
</tr>
<tr>
<td>41152</td>
<td>Aeromagnetic Interpretative Overlay</td>
<td>1:50 000</td>
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EXPLORATION LICENCE No.7891 "MULE CREEK"

NORTHERN TERRITORY

FIRST ANNUAL REPORT:
YEAR ENDED 15th NOVEMBER 1993

1. INTRODUCTION AND SUMMARY

Exploration Licence No.7891 "Mule Creek" is located approximately 960km by road SE of Darwin, in the McArthur Basin. The Licence covers approximately 357km$^2$. "Mull Creek" was granted for six years on November 16th, 1992.

This tenement is covered sparse exposures of Tawallah Group and a number of major structural lineaments. The area has been explored in the past for base metals, uranium and manganese with little result.

During the first tenement year, MIM Exploration Pty Ltd re-modelled the NTGS multi-client aeromagnetics. From this work a number of significant lineaments and magnetic domains, probably related to the Tawallah Group, were delineated.

Due to the difficulty in acquiring Aerodata as contractor and the delay in modifications to their equipment, the QUESTEM survey over the licence was not flown in the first tenement year as originally planned.
2. LOCATION AND ACCESS

The Licence area lies on the Tawallah Range (6066) and Bing Bong of (6166) (1:100 000 scale) topographic maps, approximately 100km NW from Borroloola or by road, 960km SE of Darwin, Northern Territory. The EL is bounded by latitude 15°35'S and 15°50'S and longitudes 136°16'E and 136°27'E (Fig. 1).

Access to EL7891 is by the Stuart Highway from Darwin to Daly Waters, the Carpentaria Highway to Borroloola, and along the Bing Bong road for approximately 85km to the turn-off to the Licence area.

Within the area there are numerous sand tracks which allow four-wheel drive vehicle access into most parts, although cross-country traverses are difficult due to the low and thick nature of the scrub. The terrain is mostly sandy with occasional black soil and Paper Bark swamps. Topographically the majority of the EL is flat lying.

3. TENURE

Exploration Licence No.7891 was applied for on 20th July 1992 and granted to Mount Isa Mines Limited on 16th November 1992 for a term of six years. The area covered is 111 one-minute graticular blocks, which equals 357km². The NTDME expenditure commitment for the first year was $22,500. There are no unusual conditions or requirements attached to the Licence.

4. REGIONAL GEOLOGY

EL7891 "Mule Creek" is located within Carpentaria rocks of Lower-Middle Proterozoic age and lies on the Mt Young 1:250 000 Geological sheet area (SD53-15). The Licence is extensively covered by sand, ferruginous cemented detritus and alluvium. The sequence of interest is the McArthur Group. Many base metal deposits within the North Australian Craton are hosted by this Group or its equivalents. This coupled with major lineaments which traverse the Licence makes EL7891 prospective.

The McArthur Basin contains a thick platform-cover sequence overlying the eastern edge of the Northern Australian Craton which consists of Lower Proterozoic basement rocks (Jackson et al 1987) and has a stratigraphic succession similar to the Lawn Hill Platform and Mount Isa Orogen. The basin contains four rock groups: Roper (youngest), Nathan, McArthur and Tawallah (oldest). Much of the exploration licence is covered by Cretaceous cover and sand. The aeromagnetics would suggest that some areas may have Proterozoic rocks close to the surface. The McArthur and Tawallah Groups will be briefly discussed.
Fig. 1.

LOCATION MAP
4.1 Tawallah Group

The Tawallah Group is the oldest group in the McArthur Basin consisting mainly of thick sequence of ridge-forming sandstones alternating with units of recessive volcanics and fine grained clastics (Pietsch et al., 1991). It has an unconformable contact with the Scrutton Volcanics and has a maximum thickness from 4500 - 5200m.

4.2 McArthur Group

The McArthur Group unconformably overlies the Tawallah Group and comprises a sequence of interbedded carbonates and lutites with subordinate sandstones up to approximately 4200m thick (Jackson et al., 1987). The group is sub-divided into the Umbolooga Sub-group (older) and Batten Sub-group (younger). With the expanse of surface cover it is difficult to determine what separates the Sub-groups in this area.

4.3 Structure

The McArthur Basin is dominated structurally by the Batten Fault Zone, a north-trending zone 50-70km wide and flanked by the Wearyan Shelf to the east and the Bauhinia shelf to the west. This zone is thought to represent the site of a former syndepositional graben or half graben. Deformation of the Basin has mainly been in response to block-faulting along the Batten and Wapunga Fault zones causing the reversal of the graben structure into a horst or anticlinorium. This has lead to the exposure of the Scrutton Volcanics in the middle of the Batten Fault Zone (Jackson et al., 1987).

Broad folds and warping can be attributed to the faulting as well as drag folds, steep tilting, shearing, brecciation, veining and solution alteration effects. The faults have considerable strike-slip displacement as well as strike-slip with tension gashes in the Emu Fault Zone indicating right-lateral displacement of unknown magnitude at some stage (Jackson et al., 1987).

5. PREVIOUS EXPLORATION

The western half of the current tenement was held under AP1973 by Australus Mining Co Pty Ltd in 1968 (Table 1). The Licence was operated by Placer Prospecting Pty Ltd. Eleven auger holes were drilled and samples panned to define areas of heavy mineral sand accumulations. Results were disappointing and the AP was relinquished in 1969.

AP's 2169 and 2170 were held by US Steel Int. (NY) Inc in 1969. Target mineralisation was base metals, uranium and manganese. Limited helicopter supported reconnaissance geological mapping and rock and stream sediment sampling were conducted in the present tenement. The AP's were relinquished in 1971 due to poor results.
## TABLE 1

OPEN FILE COMPANY REPORTS COVERING EL7891 "MULE CREEK"

<table>
<thead>
<tr>
<th>TENEMENT No.</th>
<th>GRANTED</th>
<th>COMPANY</th>
<th>CR NUMBER</th>
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<tr>
<td>AP1973</td>
<td>1-07-68</td>
<td>Australus Mining Co Pty Ltd</td>
<td>69/039</td>
</tr>
<tr>
<td>AP2169</td>
<td>1-02-69</td>
<td>US Steel Int (NY) Inc</td>
<td>70/075</td>
</tr>
<tr>
<td>AP2170</td>
<td>1-02-69</td>
<td>US Steel Int (NY) Inc</td>
<td>70/075</td>
</tr>
<tr>
<td>EL1425</td>
<td>23-12-76</td>
<td>Aust and New Zealand Expl Co</td>
<td>78/011</td>
</tr>
<tr>
<td>EL4678</td>
<td>20-10-84</td>
<td>BHP Minerals Ltd</td>
<td>86/009</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>87/028</td>
</tr>
<tr>
<td>EL4756</td>
<td>18-06-85</td>
<td>BHP Minerals Ltd</td>
<td>86/206</td>
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<tr>
<td>OP198</td>
<td>22-1-81</td>
<td>Amoco Production Co</td>
<td>PR82/003</td>
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<td></td>
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<td>PR82/025A-E</td>
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</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PR85015A-F</td>
</tr>
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</table>
EL1425 were explored for manganese by Australia and New Zealand Exploration. A number of shallow auger holes were drilled in the present tenement area and although ferruginous manganiferous siltstone and laminated silty argillite with abundant manganese were intersected, an economic deposit was considered unlikely. The Licence were surrendered in 1977.

BHP Minerals Co held two tenement areas, EL's 4678 and 4746, which covered the southwest portion of EL7891 "Mule Creek". A HYC equivalent base metal deposit was targeted. Extensive airborne geophysics (aeromagnetics and radiometrics) were flown to define ground targets. EM-37 soundings and limited gravity surveys over these targets was completed. Limited reconnaissance work was conducted in the present tenement area with disappointing results. Both Licences were surrendered by late 1986.

OP198 held by Amoco Productions Co, in 1981, was taken out to explore for hydrocarbons. Much of the work consisted of geophysical, geochemical and drilling of favourable hydrocarbon hosts through the southern McArthur Basin. Little work was done on EL7891 due to the extensive alluvial cover. The Licence was relinquished in 1985 with no significant results being achieved.

6. WORK BY M.I.M. EXPLORATION PTY. LTD.

6.1 Geophysics

6.1.1 NTGS Aeromagnetics

A review of the NTGS multi-client aeromagnetic data over the tenement was undertaken during 1993.

The interpretation was carried out to identify major structures in the area, with the aim of focusing further ground and possibly airborne geophysical surveys.

A pseudocolour-intensity image of the aeromagnetic data within the tenement is presented as Drawing No. 41151 and an interpretation overlay of this data is shown in Drawing No. 51152.

The interpretation shows a number of magnetic domains characterised by relatively high frequency responses. These responses are interpreted to be shallow or outcropping basic volcanics probably of the Tawallah Group. It is noted that these high frequency responses in the centre of the tenement possibly define a circular structure. For areas of smoothly varying magnetic response, sediments are interpreted as being the near surface rock type.

The smoothly varying change in amplitude of the magnetic field as you move from south to north (i.e. high amplitudes in the south and north, and low amplitudes in the centre) indicate the presence of large deep seated magnetic sources, at depths in the order of a few kilometres.
Two major structures have been noted within the tenement area. A northwest structure has been interpreted in the southern half of the tenement. Its trend is approximately parallel to other major structures within the McArthur Basin (e.g. The Calvert Fault). It's mainly defined by the truncation of an interpreted shallow volcanic unit. A second trending approximately north-northeast has been noted and again is defined by the truncation of near surface volcanic units.

6.2.1 QUESTEM Survey

Due to the difficulty in acquiring Aerodata as contractor and the delay in modifications to their equipment, the QUESTEM survey over the licence was not flown in the first tenement year as originally planned.

The survey is scheduled for mid-1994.

6.2.1.1 System and Survey Specifications

System specifications for the "Mule Creek" QUESTEM program are as follows:

<table>
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<tr>
<th>Specification</th>
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</tr>
<tr>
<td>Aircraft ground speed</td>
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</tr>
<tr>
<td>Aircraft terrain clearance</td>
<td>120 m</td>
</tr>
<tr>
<td>EM receiver bird terrain clearance</td>
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</tr>
<tr>
<td>EM transmitter base frequency</td>
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</tr>
<tr>
<td>Transmitter on-time</td>
<td>2.0 msec</td>
</tr>
<tr>
<td>Transmitter off-time</td>
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<tr>
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<tr>
<td>Mag reading duration</td>
<td>100 msec</td>
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<tr>
<td>Mag readings per second</td>
<td>2 (nominally 25)</td>
</tr>
<tr>
<td>Base station sample interval</td>
<td>100 sec</td>
</tr>
<tr>
<td>Base GPS receiver sample interval</td>
<td>1 sec</td>
</tr>
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Navigation will be controlled by using a GPS satellite receiver in autonomous mode. This data will merged with the base station data subsequent to the flight for the production of differential GPS positioning. Sixty-four digital samples will be recorded during the off-time for each waveform then binned into 15 windows for processing.

Survey specifications for the QUESTEM program are:

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<tr>
<td>Tie Line Spacing</td>
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<tr>
<td>Line Direction</td>
<td>East - West</td>
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<tr>
<td>Total Estimated Line Kilometres</td>
<td>620 line kms</td>
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</table>
7. CONCLUSIONS

The re-modelling of the NTGS multi-client aeromagnetics has defined a number of structural lineaments and magnetic domains, possibly Tawallah Group, have been defined.

Derrick Kettlewell
Project Geologist - Northern Territory
8. REFERENCES


DRAWINGS